Appendix 2-D

IN-PLACE PLANT GROWTH MATERIAL

INTRODUCTION

The following pages are a copy of a report prepared by Patrick Collins, Ph.D., Biologist/Reclamation Specialist, of Mt Nebo Scientific. The report reviews results of testing made on soil samples collected in 1991 at Bear Canyon Mine. The report recommends use of the in-place spoils for effective and relatively inexpensive reclamation procedures.

Soil sample test results are included at the end of the report.

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REVIEW OF PLANT GROWTH MATERIAL FOR RECLAMATION IN BEAR CANYON FOR THE CO-OP MINE

METHODS

Soil sample were collected by representatives of the CO-OP Mining Company in coordination with the State of Utah, Division of Oil, Gas & Mining (DOGM). These soil samples were taken in an attempt to evaluate existing plant growth material in the area that could be used at the time of final reclamation of the mine site.

This report is the result of an evaluation of the laboratory results form the sampling. Copies of the original laboratory results form which this report was based are included in the Appendix.

Several disturbed areas that will be reclaimed and other potential borrow and reference areas near the mine site were sampled. For distinction in this study the disturbed soils sampled were referred to as “spoils”, whereas the borrow and reference areas were called “native soils”.

The following parameters were analyzed form different soil depths at Inter-Mountain Laboratories, Inc., Farmington, New Mexico:

PH
EC
Saturation
Calcium
Magnesium
Sodium
SAR
Coarse Fragments
Sand, Silt, Clay (Texture)
Organic Matter
Carbonate
Phosphorus
Potassium
Alkalinity
Bulk Density
Water Retention Difference
Total Kjeldahl Nitrogen

Data from the soils laboratory report were entered on another speadsheet to facilitate comparisons and statistical analysis. Sample areas were summarized and reviewed independently, then compared to other area spoils and native soils.

RESULTS

There are basically two alternatives for reclamation on some of the disturbed areas of the mine site. One alternative is to use "in-place" spoils for the plant growing medium, whereas the use "in-place" spoils for the plant growing medium, whereas the other alternative would be to use "substitute" material form borrow areas .

Sample Identification

The soils tested were from both in-place spoils and borrow area (native) soils. Table 1 provides abbreviations that correspond to the soil reports, data summaries and CO-OP location maps. Sample test location are shown on CO-OP Plates 2-A through 2-5D.

Table 2, taken form the lab report shown in the Appendix, shows specific parameter results for each area.

Area By Area Comparisons

The soils lab report was initially reviewed to detect obvious departures from limits adequate for potential plant growing medium. Next, the areas were picked out of the lab report (see Appendix) and put in a format to facilitate area-by-area comparisons of selected parameters for the native soils and spoils. Average (Mean), standard deviations (Std. Dev.) and sample sizes (n) were listed. Therefore, one can look at this table and easily compare the mean differences for the listed parameters.

No anomalies, problems or departures form limits that should inhibit revegetation success were observed.

TABLE 1: Sample Identification Numbers

NATIVE SOILS	DISTURBED SPOILS
REFERENCE AREA REP-1	SHOP PAD SP-1 SP-2
LOWER BORROW AREA LB-1 LB-2 LB-3	SEDIMENT POND A SEDA-1 SEDA-2
TOPSOIL PILE TSP-1 TSP-2	SEDIMENT POND B SEDB-1 SEDB-2
	UPPER STORAGE PAD USP-1
	COAL STORAGE PAD CSP-1 CSP-3 CSP-4 CSP-5
	UNNAMED LHP-1 PAR-1
	SCALEHOUSE SHP-1 SHP-1

Native vs. Spoils

Table 2 shows all of the native soils grouped together (n=22) plus all of the spoils in another group (n=65). Group comparison tests showed some statistically significant differences when the spoils were compared with the native soil samples of the areas (Table 2-6). However, even if differences were noted, the spoils were still within the limits that would favor successful growing medium for final reclamation.

Recommendations

This data suggests that no significant problems exist in the spoils that were sampled. Futhermore, when compared with the native soils, the spoils did not seem to differ drastically. Therefore, it is recommended that the "in-place" spoils be used for the plant growth material at the time of final reclamation rather than borrowing soils form other sites. Some amendments (e.g. fertilizer) may still need to be added to the spoils at the time of final reclamation.

It should be noted, however, that this recommendation can only be made to the depth of the soil samples. There is no way to make inferences about the spoils in depths lower than that which was sampled. In other words, calculations should be made to substantiate the volumes of soil (spoil) required for adequate cover of the area to be seeded. To be confident that growing medium should provide adequate revegetation

success, the soil (spoil) used should only be used to the depth sampled. If grater volumes are needed, samples should be taken to a greater depth or borrow soil utilized.

The following analysis should be taken (but not limited to) at the time of final reclamation and prior to reseeding: pH, organic carbon, electrical conductivity, sodium absorption ratio, and rock fragments. These recommendations assume the area will be fertilized with nitrogen, phosphorus, and potassium at the time of final reclamation.

TABLE 2: Raw data from all sample areas.

NATIVE SOILS RAW DATA

	pH	EC	SAT.%	SAR	C.F.%	OM%	Carb.	P	K	Alka.
REP-1	7.60	0.63	27.70	0.66	18.30	0.40	23.80	8.39	0.64	1.70
	7.90	0.65	28.00	0.54	40.20	0.10	28.50	1.82	0.62	5.13
	8.10	0.52	24.10	0.50	2.60	0.10	23.50	1.00	0.48	3.67
	8.00	0.97	22.90	0.52	52.70	0.10	24.50	1.42	0.81	3.91
LB-1	7.80	1.24	39.50	0.88	17.70	2.40	19.20	2.37	0.73	4.22
	8.00	0.71	27.70	0.42	55.70	0.50	18.60	0.25	0.52	2.76
	8.00	1.05	30.50	0.39	58.80	0.90	22.70	0.53	0.47	3.39
	8.20	0.69	25.50	0.57	72.70	0.50	23.20	0.25	0.14	3.25
	7.90	5.08	29.70	0.57	30.30	0.90	18.60	0.49	0.49	2.23
LB-2	7.90	0.67	35.60	0.33	27.00	0.70	18.80	0.60	0.16	3.58
	7.90	0.58	30.30	0.46	54.10	0.60	18.30	0.18	0.13	3.28
	7.90	0.67	26.90	0.51	77.10	0.70	23.30	0.27	0.15	4.42
	8.10	0.52	29.80	0.38	40.50	2.20	22.50	0.11	0.09	3.77
	8.00	2.38	29.90	0.39	32.50	0.60	18.70	0.16	0.22	2.34
LB-3	7.90	0.66	35.00	1.00	63.50	2.80	19.10	0.76	0.29	3.85
	7.90	0.46	33.10	0.63	45.70	1.40	19.00	0.34	0.16	3.25
	8.10	0.44	28.40	0.52	72.30	0.80	22.70	0.23	0.17	3.44
	7.90	3.36	28.80	0.69	42.60	0.80	22.60	0.05	0.40	2.34
TSP-1	7.90	0.50	30.00	0.52	52.80	1.10	21.10	1.73	0.35	3.50
	8.00	0.52	29.20	0.48	36.10	0.20	23.80	1.03	0.32	4.08
TSP-2	7.80	0.05	32.00	0.36	18.80	0.80	15.20	2.47	0.61	4.66
	8.00	0.55	32.30	0.52	22.60	0.30	19.90	1.19	0.36	3.70

TABLE 2: (continued)

DISTURBED SPOILS RAW DATA

	pH	EC	SAT.%	SAR	C.F.%	OM%	Carb.	P	K	Alka.
SP-1	7.80	1.61	25.40	1.20	35.70	0.10	21.60	1.38	0.43	2.59
	7.80	1.51	28.60	1.19	39.40	0.70	21.00	1.59	0.43	2.60
SP-2	7.90	4.11	30.00	1.56	31.90	0.30	20.70	1.24	0.45	2.25
	7.70	4.05	29.20	1.62	25.10	0.40	18.70	3.95	0.78	2.58
SEDA-1	7.80	3.67	24.40	1.03	43.60	2.90	24.40	0.77	0.53	2.26
	8.00	1.02	24.10	1.03	42.40	0.30	24.50	0.93	0.27	3.41
SEDA-2	7.90	0.92	23.50	0.93	46.40	2.70	24.10	0.88	0.53	3.72
	7.70	4.23	24.10	1.05	37.70	3.70	23.70	0.91	0.56	2.50
SEDB-1	7.80	1.63	25.30	0.73	33.60	1.60	23.90	2.22	1.14	4.10
	7.90	5.03	23.60	2.00	36.70	0.80	24.20	0.95	0.82	2.56
	7.90	6.52	23.30	2.38	47.70	2.00	23.90	1.14	0.87	2.42
SEDB-2	7.60	2.68	40.20	0.85	45.50	7.60	23.70	4.05	1.87	6.07
	7.80	6.24	27.20	1.22	20.50	1.40	29.00	0.78	0.62	2.00
USP-1	7.80	4.60	33.60	2.49	48.20	1.60	34.30	1.11	1.23	1.40
	7.90	2.43	30.30	1.06	36.10	0.80	31.80	0.86	1.05	1.43
	8.10	1.36	27.40	1.53	78.10	0.50	30.10	0.92	0.95	2.08
	8.00	1.47	27.50	1.31	50.90	0.60	29.40	0.78	1.15	1.87
	7.90	2.89	29.10	0.97	46.80	0.90	31.30	1.23	1.41	1.52
	7.90	2.73	28.90	0.90	52.70	1.50	43.70	1.01	1.05	1.64
	8.10	1.86	29.80	0.89	57.30	0.80	37.10	0.97	0.81	1.68
	8.00	1.99	29.20	0.98	67.10	1.00	37.60	1.30	0.83	1.90
	8.00	2.38	28.80	0.86	63.30	0.30	35.60	1.01	0.94	1.64
	8.00	2.10	30.30	0.93	59.40	0.30	34.70	0.67	0.74	2.11
	8.10	2.08	28.60	1.02	62.90	0.30	35.50	0.86	0.75	1.92
CSP-1	7.90	1.64	28.70	1.07	53.50	3.80	30.70	0.60	0.39	1.94
	7.90	4.18	29.50	0.90	55.00	4.10	29.50	0.56	0.45	1.78
	7.90	5.04	29.80	1.16	62.20	4.20	30.10	0.69	0.50	1.85
	7.90	3.20	31.10	0.51	53.30	4.60	30.90	0.67	0.54	1.66
CSP-3	8.00	1.34	33.10	0.33	53.30	2.30	34.60	0.76	0.33	3.14
	8.10	1.21	31.00	0.43	59.40	1.80	33.00	0.52	0.26	2.30
	8.10	1.15	28.60	0.61	60.30	0.50	34.40	0.46	0.28	2.39
	8.10	2.57	28.70	0.43	70.10	0.50	37.90	0.55	0.74	2.13
	7.80	3.51	29.00	0.35	64.30	1.00	34.00	0.59	0.75	1.66
	7.80	3.42	28.70	0.38	62.50	1.50	10.80	0.70	0.62	1.52

TABLE 2: (continued)

DISTURBED SPOILS RAW DATA (continued)

	pH	EC	SAT.%	SAR	C.F.%	OM%	Carb.	P	K	Alka.
CSP-4	7.80	3.71	32.30	0.54	45.20	5.80	25.00	0.50	0.56	1.61
	7.80	3.86	30.50	0.56	49.10	5.80	23.10	0.55	0.61	1.59
	7.90	3.79	31.50	0.89	63.60	5.50	21.60	0.53	0.62	1.71
	7.80	3.81	32.00	0.53	60.20	5.50	22.80	0.52	0.60	1.66
	7.70	3.44	30.70	0.45	54.30	5.50	22.80	0.65	0.61	1.90
	7.70	3.51	31.70	0.51	55.70	5.60	21.70	0.75	0.55	1.85
CSP-5	8.10	1.32	29.10	0.65	60.20	1.40	23.70	0.58	0.16	1.61
	8.10	1.43	29.40	0.66	33.30	1.00	18.80	0.48	0.18	2.08
	8.00	1.84	36.10	0.66	58.60	2.90	23.30	0.54	0.21	1.66
	8.00	1.81	26.30	0.88	38.00	0.70	23.90	0.36	0.20	1.59
	8.00	2.53	25.60	0.95	63.00	0.50	24.50	0.32	0.18	1.45
	8.00	3.70	27.20	0.61	46.00	0.50	21.90	0.65	0.16	1.19
LHP-1	7.60	2.60	31.70	4.09	47.90	5.50	45.00	7.00	0.46	6.08
	8.10	3.11	34.30	4.89	52.10	0.80	46.50	5.12	0.29	1.98
	8.20	2.39	36.30	4.02	44.10	0.80	28.90	0.61	0.20	2.52
	8.20	2.91	33.80	4.96	33.30	0.50	28.40	0.59	0.15	2.57
	8.20	3.90	35.10	4.88	47.90	0.30	29.40	0.76	0.26	2.00
	8.20	2.04	31.70	3.19	42.00	0.70	28.20	0.59	0.27	2.36
	8.20	2.09	26.30	3.17	35.30	0.80	18.30	0.72	0.28	2.43
PAR-1	8.00	1.18	25.20	2.26	44.80	1.00	20.60	1.09	0.59	2.84
	8.10	1.07	25.20	2.87	52.50	1.80	24.10	1.26	0.58	2.90
	7.80	1.86	30.10	0.79	47.80	1.30	29.00	0.95	0.93	2.34
	7.80	1.63	30.60	0.28	40.00	1.00	31.60	0.73	0.69	2.47
	8.20	3.51	44.20	1.14	38.50	2.00	31.10	0.85	0.73	3.73
SHP-1	7.50	5.64	22.90	8.02	61.40	2.10	23.80	0.19	0.51	2.11
	7.50	2.97	28.90	1.48	38.20	1.60	21.00	0.32	0.85	2.01
	7.60	2.36	28.30	1.43	45.30	1.40	21.40	0.30	0.81	2.23
SHP-2	7.80	4.68	27.60	7.98	53.10	2.80	21.90	0.17	0.38	1.83
	7.70	3.58	29.20	4.76	32.40	1.50	23.20	0.17	0.35	1.76
	8.00	1.22	29.60	1.36	18.30	0.70	23.40	0.10	0.27	2.49
	7.90	2.65	26.60	1.68	30.80	0.90	27.90	0.08	0.68	1.73

TABLE 3: Soil sample results (area-by-area comparisons).

NATIVE SOILS Area by Area Comparisons

	pH	EC	SAT.%	SAR	C.F.%	OM%	Carb.	P	K	Alka.
REP-1										
n=	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
Mean=	7.90	0.69	25.68	0.56	28.45	0.18	25.08	3.16	0.64	3.60
Std.Dev.=	0.19	0.17	2.22	0.06	19.35	0.13	2.01	3.03	0.12	1.23
LB-1										
n=	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Mean=	7.98	1.75	30.58	0.57	47.04	1.04	20.46	0.78	0.47	3.17
Std.Dev.=	0.13	1.68	4.78	0.17	20.06	0.70	2.05	0.80	0.19	0.66
LB-2										
n=	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Mean=	7.96	0.96	30.50	0.41	46.24	0.96	20.32	0.26	0.15	3.48
Std.Dev.=	0.08	0.71	2.82	0.06	17.92	0.62	2.13	0.18	0.04	0.68
LB-3										
n=	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
Mean=	7.95	1.23	31.33	0.71	56.03	1.45	20.85	0.35	0.26	3.22
Std.Dev.=	0.09	1.23	2.81	0.18	12.32	0.82	1.80	0.26	0.10	0.55
TSP-1										
n=	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Mean=	7.95	0.51	29.60	0.50	44.45	0.65	22.45	1.38	0.34	3.79
Std.Dev.=	0.05	0.01	0.40	0.02	8.35	0.45	1.35	0.35	0.01	0.29
TSP-2										
n=	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Mean=	7.90	0.30	32.15	0.44	20.70	0.55	17.55	1.83	0.49	4.18
Std.Dev.=	0.10	0.25	0.15	0.08	1.90	0.25	2.35	0.64	0.12	0.48

TABLE 3: (continued)

DISTURBED SPOILS Area by Area Comparisons

	pH	EC	SAT.%	SAR	C.F.%	DM%	Carb.	P	K	Alka.
SP-1										
n=	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Mean=	7.80	1.56	27.00	1.20	37.55	0.40	21.30	1.49	0.43	2.60
Std. Dev.=	ERR	0.05	1.60	0.00	1.85	0.30	0.30	0.10	ERR	0.00
SP-2										
n=	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Mean=	7.80	4.08	29.60	1.59	28.50	0.35	19.70	2.60	0.62	2.42
Std. Dev.=	0.10	0.03	0.40	0.03	3.40	0.05	1.00	1.35	0.17	0.16
SEDA-1										
n=	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Mean=	7.90	2.35	24.25	1.03	43.00	1.60	24.45	0.85	0.40	2.84
Std. Dev.=	0.10	1.32	0.15	ERR	0.60	1.30	0.05	0.08	0.13	0.58
SEDA-2										
n=	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Mean=	7.80	2.58	23.80	0.99	42.05	3.20	23.90	0.90	0.55	3.11
Std. Dev.=	0.10	1.66	0.30	0.06	4.35	0.50	0.20	0.01	0.02	0.61
SEDB-1										
n=	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Mean=	7.87	4.39	24.07	1.70	39.33	1.47	24.00	1.44	0.94	3.03
Std. Dev.=	0.05	2.05	0.88	0.71	6.05	0.50	0.14	0.56	0.14	0.76
SEDB-2										
n=	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Mean=	7.70	4.46	33.70	1.04	33.00	4.50	26.35	2.42	1.25	4.04
Std. Dev.=	0.10	1.78	6.50	0.19	12.50	3.10	2.65	1.64	0.62	2.03
USP-1										
n=	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00
Mean=	7.98	2.35	29.41	1.18	56.62	0.78	34.65	0.97	0.99	1.74
Std. Dev.=	0.09	0.84	1.61	0.46	10.87	0.43	3.88	0.18	0.20	0.24
CSP-1										
n=	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
Mean=	7.90	3.52	29.78	0.91	56.00	4.18	30.30	0.63	0.47	1.81
Std. Dev.=	ERR	1.26	0.86	0.25	3.64	0.29	0.55	0.05	0.06	0.10

TABLE 3: (continued)

DISTURBED SPOILS Area by Area Comparisons (continued

	pH	EC	SAT.%	SAR	C.F.%	OM%	Carb.	P	K	Alka.
CSP-3										
n=	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
Mean=	7.98	2.20	29.85	0.42	61.65	1.27	30.78	0.60	0.50	2.19
Std. Dev.=	0.13	1.01	1.67	0.09	5.10	0.66	9.06	0.10	0.21	0.53
CSP-4										
n=	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
Mean=	7.78	3.69	31.45	0.58	54.68	5.62	22.83	0.58	0.59	1.72
Std. Dev.=	0.07	0.16	0.65	0.14	6.22	0.13	1.12	0.09	0.03	0.12
CSP-5										
n=	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
Mean=	8.03	2.11	28.95	0.74	49.85	1.17	22.68	0.49	0.18	1.60
Std. Dev.=	0.05	0.81	3.48	0.13	11.44	0.84	1.91	0.12	0.02	0.27
LHP-1										
n=	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00
Mean=	8.10	2.72	32.74	4.17	43.23	1.34	32.10	2.20	0.27	2.85
Std. Dev.=	0.21	0.61	3.06	0.72	6.39	1.71	9.34	2.49	0.09	1.34
PAR-1										
n=	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Mean=	7.98	1.85	31.06	1.47	44.72	1.42	27.28	0.98	0.70	2.86
Std. Dev.=	0.16	0.88	6.96	0.96	5.12	0.41	4.26	0.18	0.13	0.49
SHP-1										
n=	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Mean=	7.53	3.66	26.70	3.64	48.30	1.70	22.07	0.27	0.72	2.12
Std. Dev.=	0.05	1.42	2.70	3.09	9.71	0.29	1.24	0.06	0.15	0.09
SHP-2										
n=	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
Mean=	7.85	3.03	28.25	3.95	33.65	1.48	24.10	0.13	0.42	1.95
Std. Dev.=	0.11	1.27	1.21	2.68	12.49	0.82	2.27	0.04	0.16	0.31

TABLE 4: Group comparisons of the soil sample areas.

NATIVE SOILS Total Group Comparisons

A.	pH	EC	SAT.%	SAR	C.F.%	OM%	Carb.	P	K	Alka.
TOTAL										
n=	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00
Mean=	7.95	1.04	29.86	0.54	42.48	0.86	21.25	1.17	0.38	3.48
Std.Dev.=	0.12	1.12	3.69	0.16	19.68	0.72	2.89	1.73	0.21	0.81

DISTURBED SPOILS Total Group Comparisons

B.	pH	EC	SAT.%	SAR	C.F.%	OM%	Carb.	P	K	Alka.
TOTAL										
n=	65.00	65.00	65.00	65.00	65.00	65.00	65.00	65.00	65.00	65.00
Mean=	7.79	2.77	28.95	1.62	46.80	1.90	26.67	0.99	0.59	2.23
Std.Dev.=	0.98	1.35	5.22	1.65	14.53	1.81	8.10	1.13	0.34	0.93

GROUP COMPARISON TESTS (t-tests)

C.										
t=	0.23	-5.41	0.76	-3.05	-1.10	-2.62	-3.06	0.56	-2.72	5.62
Deg.F.=	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00
Sig.Lev.=	N.S.	**	N.S.	**	N.S.	**	**	N.S.	**	**

t= t value; Deg.F.= Degrees of Freedom; Sig.Lev.= Significance Level (** indicates less than .05)

APPENDIX

- SOILS LABORATORY RESULTS -

(RAW DATA)

Inter-Mountain Laboratories, Inc.

2506 West Main Street Farmington, New Mexico 87401 Tel. (505) 326-4737

CO-OP MINING COMPANY
HUNTINGTON, UTAH
MINE: BEAR CANYON

DATE REPORTED: August 20, 1991

Lab No.	Location	Depths	pH	EC mmhos/cm @ 25°C	Saturation %	Calcium meq/l	Magnesium meq/l	Sodium meq/l	SAR	Coarse Fragments %	Sand %	Silt %	Clay %	Texture
12649	91REP-1	0-2	7.6	0.63	27.7	4.61	1.10	1.11	0.66	18.3	60.0	34.7	5.3	SANDY LOAM
12650		2-9	7.9	0.65	28.0	4.53	1.57	0.94	0.54	40.2	61.8	31.1	7.1	SANDY LOAM
12651		9-14	8.1	0.52	24.1	3.17	1.19	0.74	0.50	2.6	77.3	19.2	3.5	LOAMY SAND
12652		14-23	8.0	0.97	22.9	5.40	2.89	1.05	0.52	52.7	65.5	27.4	7.1	SANDY LOAM
12653	91SEDB-1	0-6	7.8	1.63	25.3	10.3	6.86	2.14	0.73	33.6	66.4	27.4	6.2	SANDY LOAM
12654		6-12	7.9	5.03	23.6	21.5	41.1	11.2	2.00	36.7	66.4	25.6	8.0	SANDY LOAM
12655		12-24	7.9	6.52	23.3	25.6	58.3	15.4	2.38	47.7	66.4	25.6	8.0	SANDY LOAM
12656	91SEDA-1	0-12	7.8	3.67	24.4	21.4	24.9	4.97	1.03	43.6	62.7	30.6	6.7	SANDY LOAM
12657		12-24	8.0	1.02	24.1	4.61	4.41	2.19	1.03	42.4	60.9	30.9	8.2	SANDY LOAM
12658	91SEDA-2	0-12	7.9	0.92	23.5	3.97	3.46	1.80	0.93	46.4	59.1	32.7	8.2	SANDY LOAM
12659		12-24	7.7	4.23	24.1	24.0	30.5	5.50	1.05	37.7	64.5	29.1	6.4	SANDY LOAM
12660	91SP-1	12-24	7.8	1.61	27.6	9.25	6.42	3.36	1.20	35.7	58.2	34.5	7.3	SANDY LOAM
12661		24-72	7.8	1.51	26.2	8.71	5.38	3.17	1.19	39.4	57.3	32.7	10.0	SANDY LOAM
12662	91SP-2	12-36	7.9	4.11	25.4	16.7	32.8	7.77	1.56	31.9	55.5	37.8	6.7	SANDY LOAM
12663		36-60	7.7	4.05	28.6	21.1	25.4	7.83	1.62	25.1	56.4	37.8	5.8	SANDY LOAM
12664	91TSP-1	0-6	7.9	0.50	30.0	3.25	1.00	0.76	0.52	52.8	60.9	32.4	6.7	SANDY LOAM
12665		6-16	8.0	0.52	29.2	3.15	1.62	0.74	0.48	36.1	59.1	35.1	5.8	SANDY LOAM
12666	91TSP-2	0-4	7.8	0.54	32.0	3.83	0.88	0.55	0.36	18.8	70.0	28.7	1.3	SANDY LOAM
12667		4-24	8.0	0.55	32.3	3.52	1.06	0.78	0.52	22.6	64.5	31.5	4.0	SANDY LOAM

Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage, Exch= Exchangeable, Avail= Available

Inter-Mountain Laboratories, Inc.
2506 West Main Street Farmington, New Mexico 87401 Tel. (505) 326-4737

CO-OP MINING COMPANY
HUNTINGTON, UTAH
MINE: BEAR CANYON

DATE REPORTED: August 20, 1991

Lab No.	Location	Depths	Organic Matter %	Carbonate %	P ppm	K PE meq/l	Alkalinity PE meq/l	Bulk Density *	Water Retention Difference in/in*	Total Kjeldahl Nitrogen %	1/3 bar	15 bar
12649	91REP-1	0-2	0.4	23.8	8.39	0.64	5.40	1.70	0.1	0.11	11.6	5.3
12650		2-9	<0.1	28.5	1.82	0.63	5.13	1.50	0.1	0.06	10.2	5.0
12651		9-14	<0.1	23.5	1.00	0.48	3.67	1.40	<0.1	0.04	5.6	2.9
12652		14-23	<0.1	24.5	1.42	0.81	3.91	1.50	<0.1	0.04	9.3	4.4
12653	91SEDB-1	0-6	1.6	23.9	2.22	1.14	4.10	1.60	0.1	0.10	9.3	4.7
12654		6-12	0.8	24.2	0.95	0.82	2.56	1.90	<0.1	0.05	8.8	5.1
12655		12-24	2.0	23.9	1.14	0.87	2.42	1.90	<0.1	0.07	9.0	5.0
12656	91SEDA-1	0-12	2.9	24.4	0.77	0.53	2.26	1.40	<0.1	0.10	9.0	4.9
12657		12-24	0.3	24.5	0.93	0.27	3.41	2.00	0.1	0.05	9.7	4.8
12658	91SEDA-2	0-12	2.7	24.1	0.88	0.53	3.72	1.60	<0.1	0.08	9.3	4.8
12659		12-24	3.7	23.7	0.91	0.56	2.50	1.80	<0.1	0.11	8.9	4.9
12660	91SP-1	12-24	0.1	21.6	1.38	0.43	2.59	1.80	0.1	0.05	13.1	6.0
12661		24-72	0.7	21.0	1.59	0.43	2.60	1.80	0.1	0.05	12.4	6.9
12662	91SP-2	12-36	0.3	20.7	1.24	0.45	2.25	1.50	0.1	0.04	11.4	6.3
12663		36-60	0.4	18.7	3.95	0.78	2.58	1.70	0.1	0.07	12.3	6.6
12664	91TSP-1	0-6	1.1	21.1	1.73	0.35	3.50	1.60	0.1	0.08	12.0	7.7
12665		6-16	0.2	23.8	1.03	0.32	4.08	1.70	0.1	0.06	11.8	6.8
12666	91TSP-2	0-4	0.8	15.2	2.47	0.61	4.66	1.80	0.1	0.09	8.5	5.1
12667		4-24	0.3	19.9	1.19	0.36	3.70	1.50	0.1	0.05	10.0	5.8

* Air dry bulk density was substituted for 1/3 bar bulk density in calculations.
Abbreviations for extractants: PE= Saturated Paste Extract, H2OSol= water soluble,ABPTA= Ammonium Bicarbonate-DPTA, AAO= Acid Ammonium Oxalate

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CO-OP MINING COMPANY
HUNTINGTON, UTAH
MINE: BEAR CANYON

DATE REPORTED: August 20, 1991

Lab No.	Location	Depths	pH	EC mmhos/cm @ 25°C	Saturation %	Calcium meq/l	Magnesium meq/l	Sodium meq/l	SAR	Coarse Fragments %	Sand %	Silt %	Clay %	Texture
12658	91SEDA-2	0-12	7.9	0.92	23.5	3.97	3.46	1.80	0.93	46.4	59.1	32.7	8.2	SANDY LOAM
12669	12658(DUP)	0-12	7.9	0.82	25.8	3.22	2.90	1.78	1.02		59.1	32.4	8.5	SANDY LOAM
12667		4-24	8.0	0.55	32.3	3.52	1.06	0.78	0.52	22.6	64.5	31.5	4.0	SANDY LOAM
12670	12667(DUP)	4-24	8.0	0.53	33.0	3.34	1.01	0.72	0.49		64.5	30.6	4.9	SANDY LOAM

Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage, Exch= Exchangeable, Avail= Available

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CO-OP MINING COMPANY
HUNTINGTON, UTAH
MINE: BEAR CANYON

DATE REPORTED: August 20, 1991

Lab No.	Location	Depths	Organic Matter %	Carbonate %	P ppm	K PE meq/l	Alkalinity PE meq/l	Bulk Density *	Water Retention Difference in/in*	Total Kjeldahl Nitrogen %	1/3 bar	15 bar
12658	91SEDA-2	0-12	2.7	24.1	0.88	0.53	3.72	1.60	<0.1	0.08	9.3	4.8
12669	12658(DUP)	0-12	2.8	24.3	0.77	0.56	3.32					
12667		4-24	0.3	19.9	1.19	0.36	3.70	1.50	0.1	0.05	10.0	5.8
12670	12667(DUP)	4-24	0.8	19.8	1.28	0.37	3.68					

* Air dry bulk density was substituted for 1/3 bar bulk density.
Abbreviations for extractants: PE= Saturated Paste Extract, H2OSol= water soluble,ABPTA= Ammonium Bicarbonate-DPTA, AAO= Acid Ammonium Oxalate

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CO-OP MINING COMPANY
HUNTINGTON, UTAH
MINE: BEAR CANYON

DATE REPORTED: September 11, 1991

Lab No.	Location	Depths	pH	EC mmhos/cm @ 25°C	Saturation %	Calcium meq/l	Magnesium meq/l	Sodium meq/l	SAR	Coarse Fragments %	Sand %	Silt %	Clay %	Texture
13257	91-SED-B-2	0-24	7.6	2.68	40.2	21.7	9.31	3.36	0.85	45.5	62.4	27.6	10.0	SANDY LOAM
13258		24-48	7.8	6.24	27.2	28.4	49.8	7.63	1.22	20.5	59.6	26.4	14.0	SANDY LOAM

Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage, Exch= Exchangeable, Avail= Available

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CO-OP MINING COMPANY
HUNTINGTON, UTAH
MINE: BEAR CANYON

DATE REPORTED: September 11, 1991

Lab No.	Location	Depths	Organic Matter %	Carbonate %	P ppm	K PE meq/l	Alkalinity PE meq/l	Bulk Density *	Water Retention Difference in/in*	Total Kjeldahl Nitrogen %	1/3 bar	15 bar
13257	91-SED-8-2	0-24	7.6	23.7	4.05	1.87	6.07	**	**	0.16	8.5	7.6
13258		24-48	1.4	29.0	0.78	0.62	2.00	1.90	<0.1	0.06	7.4	5.8

* Air dry bulk density was substituted for 1/3 bar bulk density in calculations.
** No clods present in sample to do a bulk density.
Abbreviations for extractants: PE= Saturated Paste Extract, H2OSol= water soluble, ABPTA= Ammonium Bicarbonate-DPTA, AAO= Acid Ammonium Oxalate

Inter-Mountain Laboratories, Inc.

2506 West Main Street | Farmington, New Mexico 87401 | Tel. (505) 326-4737

CO-OP MINING COMPANY
HUNTINGTON, UTAH
MINE: BEAR CANYON

DATE REPORTED: November 14, 1991

Lab No.	Location	Depths	pH	EC mmhos/cm @ 25°C	Saturation %	Calcium meq/l	Magnesium meq/l	Sodium meq/l	SAR	Coarse Fragments %	Sand %	Silt %	Clay %	Texture
14572	91-SHP-1	0.0-0.5	7.5	5.64	22.9	18.8	20.4	35.5	8.02	61.4	71.5	19.8	8.7	SANDY LOAM
14573		0.5-2.0	7.5	2.97	28.9	17.5	12.8	5.76	1.48	38.2	64.2	26.2	9.6	SANDY LOAM
14574		2.0-5.0	7.6	2.36	28.3	13.0	10.1	4.87	1.43	45.3	62.4	28.0	9.6	SANDY LOAM
14575	91-SHP-2	0.0-0.5	7.8	4.68	27.6	10.6	12.3	27.0	7.98	53.1	62.7	26.8	10.5	SANDY LOAM
14576		0.5-1.0	7.7	3.58	29.2	11.9	11.0	16.1	4.76	32.4	55.5	30.3	14.2	SANDY LOAM
14577		1.0-3.0	8.0	1.22	29.6	3.98	6.53	3.11	1.36	18.3	50.9	34.9	14.2	LOAM
14578		3.0-5.0	7.9	2.65	26.6	8.28	21.8	6.52	1.68	30.8	57.3	28.5	14.2	SANDY LOAM

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CO-OP MINING COMPANY
HUNTINGTON, UTAH
MINE: BEAR CANYON

DATE REPORTED: November 14, 1991

Lab No.	Location	Depths	Organic Matter %	Carbonate %	P ppm	K PE meq/l	Alkalinity PE meq/l	Bulk Density	Water Retention Difference in/in*	Total Kjeldahl Nitrogen %	1/3 bar	15 bar	/3 bar	15 bar
14572	91-SHP-1	0.0-0.5	2.1	23.8	0.19	0.51	2.11	2.1	<0.1	0.06	9.0	4.4	9.0	4.4
14573		0.5-2.0	1.6	21.0	0.32	0.85	2.01	1.9	0.1	0.07	11.0	5.5	11.0	5.5
14574		2.0-5.0	1.4	21.4	0.30	0.81	2.23	1.7	0.1	0.05	11.2	5.6	11.2	5.6
14575	91-SHP-2	0.0-0.5	2.8	21.9	0.17	0.38	1.83	1.9	0.1	0.11	11.5	6.1	11.5	6.1
14576		0.5-1.0	1.5	23.2	0.17	0.35	1.76	2.0	0.1	0.06	12.9	6.8	12.9	6.8
14577		1.0-3.0	0.7	23.4	0.10	0.27	2.49	1.7	0.1	0.04	13.9	5.9	13.9	5.9
14578		3.0-5.0	0.9	27.9	0.08	0.68	1.73	1.8	0.1	0.03	12.2	14.0	12.2	14.0

* Air dry bulk density was substituted for 1/3 bar bulk density.
Abbreviations for extractants: PE= Saturated Paste Extract, H2OSol= water soluble, ABPTA= Ammonium Bicarbonate-DPTA, AAO= Acid Ammonium Oxalate

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CO-OP MINING COMPANY
HUNTINGTON, UTAH
MINE: BEAR CANYON

DATE REPORTED: November 14, 1991

Lab No.	Location	Depths	pH	EC mmhos/cm @ 25°C	Saturation %	Calcium meq/l	Magnesium meq/l	Sodium meq/l	SAR	Coarse Fragments %	Sand %	Silt %	Clay %	Texture
14574		2.0-5.0	7.6	2.36	28.3	13.0	10.1	4.87	1.43	45.3	62.4	28.0	9.6	SANDY LOAM
14580	14574(DUP)	2.0-5.0	7.6	2.31	28.4	12.6	9.95	4.27	1.27		62.4	28.0	9.6	SANDY LOAM

Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage, Exch= Exchangeable, Avail= Available

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CO-OP MINING COMPANY
HUNTINGTON, UTAH
MINE: BEAR CANYON

DATE REPORTED: November 14, 1991

Lab No.	Location	Depths	Organic Matter %	Carbonate %	P ppm	K PE meq/l	Alkalinity PE meq/l	Bulk Density	Water Retention Difference in/in*	Total Kjeldahl Nitrogen %	1/3 bar	15 bar
14574		2.0-5.0	1.4	21.4	0.30	0.81	2.23	1.7	0.1	0.05	11.2	5.6
14580	14574(DUP)	2.0-5.0	1.2	21.5	0.21	0.79	1.99			0.05	11.4	5.6

* Air dry bulk density was substituted for 1/3 bar bulk density.
Abbreviations for extractants: PE= Saturated Paste Extract, H2OSol= water soluble,ABPTA= Ammonium Bicarbonate-DPTA, AAO= Acid Ammonium Oxalate

Inter-Mountain Laboratories, Inc.
2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CO-OP MINING COMPANY
HUNTINGTON, UTAH
MINE: BEAR CANYON

DATE REPORTED: September 30, 1991

Lab No.	Location	Depths	pH	EC mmhos/cm @ 25°C	Saturation %	Calcium meq/l	Magnesium meq/l	Sodium meq/l	SAR	Coarse Fragments %	Sand %	Silt %	Clay %	Texture
13347	91USP-1	0.0-0.5	7.8	4.60	33.6	31.5	23.1	13.0	2.49	48.2	50.0	36.9	13.1	LOAM
13348		0.5-1.0	7.9	2.43	30.3	12.8	16.7	4.09	1.06	36.1	48.2	33.3	18.5	LOAM
13349		1.0-2.0	8.1	1.36	27.4	3.86	6.94	3.55	1.53	78.1	53.6	33.3	13.1	SANDY LOAM
13350		2.0-3.0	8.0	1.47	27.5	4.51	8.36	3.33	1.31	50.9	53.6	32.4	14.0	SANDY LOAM
13351		3.0-4.0	7.9	2.89	29.1	16.6	21.1	4.21	0.97	46.8	51.8	35.1	13.1	LOAM
13352		4.0-5.0	7.9	2.73	28.9	14.4	19.9	3.73	0.90	52.7	55.5	31.4	13.1	SANDY LOAM
13353		5.0-6.0	8.1	1.86	29.8	7.31	11.8	2.74	0.89	57.3	54.5	34.2	11.3	SANDY LOAM
13354		6.0-7.0	8.0	1.99	29.2	7.82	13.8	3.22	0.98	67.1	57.3	31.4	11.3	SANDY LOAM
13355		7.0-8.0	8.0	2.38	28.8	11.5	17.0	3.23	0.86	63.3	59.1	29.6	11.3	SANDY LOAM
13355A		8.0-9.0	8.0	2.10	30.3	7.91	14.4	3.11	0.93	59.4	56.4	31.4	12.2	SANDY LOAM
13356		9.0-10.0	8.1	2.08	28.6	8.76	14.6	3.48	1.02	62.9	57.3	31.4	11.3	SANDY LOAM
13357	91LH	0.0-0.5	7.6	2.60	31.7	13.6	7.21	13.2	4.09	47.9	66.4	24.1	9.5	SANDY LOAM
13358		0.5-1.0	8.1	3.11	34.3	6.57	15.1	16.1	4.89	52.1	35.5	46.0	18.5	LOAM
13359		1.0-1.5	8.2	2.39	36.3	4.44	13.1	11.9	4.02	44.1	49.1	34.2	16.7	LOAM
13360		1.5-2.6	8.2	2.91	33.8	4.14	13.7	14.8	4.96	33.3	50.0	34.2	15.8	LOAM
13361		4.0-6.0	8.2	3.90	35.1	6.20	23.8	18.9	4.88	47.9	41.8	38.7	19.5	LOAM
13362		6.0-8.0	8.2	2.04	31.7	4.16	10.8	8.73	3.19	42.0	54.5	30.6	14.9	SANDY LOAM
13363		8.0-0.0	8.2	2.09	26.3	4.42	10.3	8.61	3.17	35.3	60.9	26.9	12.2	SANDY LOAM
13364	91CSP-1	0.0-0.5	7.9	1.64	28.7	7.05	9.75	3.09	1.07	53.5	54.5	32.4	13.1	SANDY LOAM
13365		0.5-1.0	7.9	4.18	29.5	25.5	36.9	5.05	0.90	55.0	55.5	31.4	13.1	SANDY LOAM

Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage, Exch= Exchangeable, Avail= Available

Inter-Mountain Laboratories, Inc.

2506 West Main Street | Farmington, New Mexico 87401 | Tel. (505) 326-4737

CO-OP MINING COMPANY
HUNTINGTON, UTAH
MINE: BEAR CANYON

DATE REPORTED: September 30, 1991

Lab No.	Location	Depths	Organic Matter %	Carbonate %	P ppm	K PE meq/l	Alkalinity PE meq/l	Bulk Density *	Water Retention Difference in/in*	Total Kjeldahl Nitrogen %	1/3 bar	15 bar
13347	91USP-1	0.0-0.5	1.6	34.3	1.11	1.23	1.40	2.1	0.1	0.06	11.8	5.8
13348		0.5-1.0	0.8	31.8	0.86	1.05	1.43	2.1	0.1	0.04	12.3	5.8
13349		1.0-2.0	0.5	30.1	0.92	0.95	2.08	2.0	<0.1	0.04	11.1	5.5
13350		2.0-3.0	0.6	29.4	0.78	1.15	1.87	1.9	0.1	0.03	11.3	5.5
13351		3.0-4.0	0.9	31.3	1.23	1.41	1.52	2.0	0.1	0.04	11.7	6.2
13352		4.0-5.0	1.5	43.7	1.01	1.05	1.64	1.8	0.1	0.04	11.8	6.0
13353		5.0-6.0	0.8	37.1	0.97	0.81	1.68	1.9	0.1	0.04	11.7	6.1
13354		6.0-7.0	1.0	37.6	1.30	0.83	1.90	1.8	<0.1	0.04	12.1	6.1
13355		7.0-8.0	0.3	35.6	1.01	0.94	1.64	1.9	<0.1	0.04	11.3	5.6
13355A		8.0-9.0	0.3	34.7	0.67	0.74	2.11	2.1	0.1	0.04	12.2	5.5
13356		9.0-10.0	0.3	35.5	0.86	0.75	1.92	1.9	0.1	0.04	11.8	5.2
13357	91LH	0.0-0.5	5.5	45.0	7.00	0.46	6.08	1.9	<0.1	0.27	8.1	5.2
13358		0.5-1.0	0.8	46.5	5.12	0.29	1.98	2.1	0.1	0.05	12.8	8.3
13359		1.0-1.5	0.8	28.9	0.61	0.20	2.52	2.0	0.1	0.02	11.6	7.2
13360		1.5-2.6	0.5	28.4	0.59	0.15	2.57	2.0	0.1	0.03	10.9	7.3
13361		4.0-6.0	0.3	29.4	0.76	0.26	2.00	2.1	<0.1	0.02	11.5	7.7
13362		6.0-8.0	0.7	28.2	0.59	0.27	2.36	2.0	0.1	0.03	10.9	7.0
13363		8.0-0.0	0.8	18.3	0.72	0.28	2.43	1.9	<0.1	0.01	9.1	6.1
13364	91CSP-1	0.0-0.5	3.8	30.7	0.60	0.39	1.94	**	**	0.02	13.2	7.8
13365		0.5-1.0	4.1	29.5	0.56	0.45	1.78	2.0	<0.1	0.03	11.6	7.7

* Air dry bulk density was substituted for 1/3 bar bulk density.
** No clods present in samples to do a bulk density.
Abbreviations for extractants: PE= Saturated Paste Extract, H2OSol= water soluble, ABPTA= Ammonium Bicarbonate-DPTA, AAO= Acid Ammonium Oxalate

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CO-OP MINING COMPANY
HUNTINGTON, UTAH
MINE: BEAR CANYON

DATE REPORTED: September 30, 1991

Lab No.	Location	Depths	pH	EC mmhos/cm @ 25°C	Saturation %	Calcium meq/l	Magnesium meq/l	Sodium meq/l	SAR	Coarse Fragments %	Sand %	Silt %	Clay %	Texture
13366	91CSP-1	1.0-4.0	7.9	5.04	29.8	27.9	50.8	7.25	1.16	62.2	55.5	32.3	12.2	SANDY LOAM
13367		4.0-8.0	7.9	3.20	31.1	22.6	23.2	2.43	0.51	53.3	55.5	32.3	12.2	SANDY LOAM
13368	91CSP-3	0.0-0.5	8.0	1.34	33.1	7.40	7.87	0.91	0.33	53.3	48.2	40.5	11.3	LOAM
13369		0.5-1.0	8.1	1.21	31.0	7.22	6.55	1.13	0.43	59.4	50.0	38.7	11.3	LOAM
13370		1.0-2.0	8.1	1.15	28.6	4.85	6.72	1.46	0.61	60.3	50.9	36.0	13.1	LOAM
13371		2.0-3.0	8.1	2.57	28.7	10.1	20.5	1.67	0.43	70.1	48.2	39.6	12.2	LOAM
13372		3.0-6.0	7.8	3.51	29.0	28.0	23.4	1.79	0.35	64.3	52.7	36.9	10.4	SANDY LOAM
13373		6.0-0.0	7.8	3.42	28.7	27.1	22.0	1.86	0.38	62.5	53.6	36.0	10.4	SANDY LOAM
13374	91CSP-4	0.0-0.5	7.8	3.71	32.3	27.1	26.3	2.80	0.54	45.2	55.5	33.2	11.3	SANDY LOAM
13375		0.5-1.0	7.8	3.86	30.5	27.6	26.7	2.93	0.56	49.1	59.1	32.4	8.5	SANDY LOAM
13376		1.0-2.0	7.9	3.79	31.5	26.0	27.3	4.61	0.89	63.6	58.4	30.3	11.3	SANDY LOAM
13377		2.0-3.0	7.8	3.81	32.0	26.2	25.7	2.70	0.53	60.2	58.4	30.3	11.3	SANDY LOAM
13378		3.0-4.0	7.7	3.44	30.7	28.8	19.0	2.18	0.45	54.3	56.5	32.2	11.3	SANDY LOAM
13379		4.0-5.0	7.7	3.51	31.7	30.2	22.0	2.59	0.51	55.7	58.4	31.2	10.4	SANDY LOAM
13380	91CSP-5	0.0-0.5	8.1	1.32	29.1	6.67	5.34	1.59	0.65	60.2	50.0	38.7	11.3	LOAM
13381		0.5-1.0	8.1	1.43	29.4	7.17	7.20	1.78	0.66	33.3	52.9	36.7	10.4	SANDY LOAM
13382		1.0-1.5	8.0	1.84	36.1	10.2	10.2	1.92	0.60	58.6	47.5	38.5	14.0	LOAM
13383		1.5-2.0	8.0	1.81	26.3	8.80	9.67	2.67	0.88	38.0	56.9	33.6	9.5	SANDY LOAM
13384		2.0-3.0	8.0	2.53	25.6	15.9	14.1	3.69	0.95	63.0	58.2	32.3	9.5	SANDY LOAM
13385		3.0-6.0	8.0	3.70	27.2	26.5	26.0	3.14	0.61	46.0	52.7	36.0	11.3	SANDY LOAM

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CO-OP MINING COMPANY
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MINE: BEAR CANYON

DATE REPORTED: September 30, 1991

Lab No.	Location	Depths	Organic Matter %	Carbonate %	P ppm	K PE meq/l	Alkalinity PE meq/l	Bulk Density *	Water Retention Difference in/in*	Total Kjeldahl Nitrogen %	1/3 bar	15 bar
13366	91CSP-1	1.0-4.0	4.2	30.1	0.69	0.50	1.85	**	**	0.13	11.6	7.9
13367		4.0-8.0	4.6	30.9	0.67	0.54	1.66	1.9	<0.1	0.17	12.2	8.3
13368	91CSP-3	0.0-0.5	2.3	34.6	0.76	0.33	3.14	1.9	0.1	0.07	14.1	8.5
13369		0.5-1.0	1.8	33.0	0.52	0.26	2.30	2.0	<0.1	0.05	13.0	7.7
13370		1.0-2.0	0.5	34.4	0.46	0.28	2.39	2.1	<0.1	0.04	11.8	7.3
13371		2.0-3.0	0.5	37.9	0.55	0.74	2.13	2.2	<0.1	0.04	11.8	6.3
13372		3.0-6.0	1.0	34.0	0.59	0.75	1.66	**	**	0.05	10.8	5.7
13373		6.0-0.0	1.5	10.8	0.70	0.62	1.52	1.9	<0.1	0.07	11.1	5.5
13374	91CSP-4	0.0-0.5	5.8	25.0	0.50	0.56	1.61	1.6	<0.1	0.28	11.0	5.8
13375		0.5-1.0	5.8	23.1	0.55	0.61	1.59	**	**	0.28	10.8	5.8
13376		1.0-2.0	5.5	21.6	0.53	0.62	1.71	1.5	<0.1	0.28	11.0	5.9
13377		2.0-3.0	5.5	22.8	0.52	0.60	1.66	**	**	0.29	10.7	5.9
13378		3.0-4.0	5.5	22.8	0.65	0.61	1.90	**	**	0.26	10.7	5.4
13379		4.0-5.0	5.6	21.7	0.75	0.55	1.85	1.3	<0.1	0.32	10.5	6.1
13380	91CSP-5	0.0-0.5	1.4	23.7	0.58	0.16	1.61	2.0	<0.1	0.07	10.0	5.7
13381		0.5-1.0	1.0	18.8	0.48	0.18	2.08	2.0	0.1	0.06	10.2	4.1
13382		1.0-1.5	2.9	23.3	0.54	0.21	1.66	1.9	<0.1	0.11	7.2	6.9
13383		1.5-2.0	0.7	23.9	0.36	0.20	1.59	1.9	0.1	0.05	9.7	5.1
13384		2.0-3.0	0.5	24.5	0.32	0.18	1.45	1.9	<0.1	0.03	10.6	4.9
13385		3.0-6.0	0.5	21.9	0.65	0.16	1.19	1.8	0.1	0.04	11.4	5.4

* Air dry bulk density was substituted for 1/3 bar bulk density.
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Abbreviations for extractants: PE= Saturated Paste Extract, H2OSol= water soluble, ABPTA= Ammonium Bicarbonate-DPTA, AAO= Acid Ammonium Oxalate

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Lab No.	Location	Depths	pH	EC mmhos/cm @ 25°C	Saturation %	Calcium meq/l	Magnesium meq/l	Sodium meq/l	SAR	Coarse Fragments %	Sand %	Silt %	Clay %	Texture
13386	91PAR-1	0.0-0.5	8.0	1.18	25.2	5.31	2.28	4.40	2.26	44.8	66.4	25.1	8.5	SANDY LOAM
13387		0.5-1.0	8.1	1.07	25.2	3.61	1.51	4.60	2.87	52.5	66.4	26.0	7.6	SANDY LOAM
13388		1.0-2.0	7.8	1.86	30.1	12.3	4.81	2.31	0.79	47.8	62.4	29.1	8.5	SANDY LOAM
13389		2.0-5.0	7.8	1.63	30.6	11.0	4.66	0.78	0.28	40.0	56.9	30.9	12.2	SANDY LOAM
13390		5.0-7.0	8.2	3.51	44.2	7.46	26.4	4.69	1.14	38.5	43.3	42.7	14.0	LOAM

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Lab No.	Location	Depths	Organic Matter %	Carbonate %	P ppm	K PE meq/l	Alkalinity PE meq/l	Bulk Density *	Water Retention Difference in/in*	Total Kjeldahl Nitrogen %	1/3 bar	15 bar
13386	91PAR-1	0.0-0.5	1.0	20.6	1.09	0.59	2.84	**	**	0.08	10.1	4.2
13387		0.5-1.0	1.8	24.1	1.26	0.58	2.90	1.7	<0.1	0.08	7.7	4.7
13388		1.0-2.0	1.3	29.0	0.95	0.93	2.34	1.8	0.1	0.08	11.7	5.2
13389		2.0-5.0	1.0	31.6	0.73	0.69	2.47	1.7	0.1	0.07	13.2	5.6
13390		5.0-7.0	2.0	31.1	0.85	0.73	3.73	1.7	0.1	0.12	19.5	9.3

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Lab No.	Location	Depths	pH	EC mmhos/cm @ 25°C	Saturation %	Calcium meq/l	Magnesium meq/l	Sodium meq/l	SAR	Coarse Fragments %	Sand %	Silt %	Clay %	Texture
13349		1.0-2.0	8.1	1.36	27.4	3.86	6.94	3.55	1.53	78.1	53.6	33.3	13.1	SANDY LOAM
13392	13349(DUP)	1.0-2.0	8.2	1.47	27.4	3.99	6.93	3.41	1.46		52.7	34.2	13.1	SANDY LOAM
13376		1.0-2.0	7.9	3.79	31.5	26.0	27.3	4.61	0.89	63.6	58.4	30.3	11.3	SANDY LOAM
13393	13376(DUP)	1.0-2.0	7.9	3.97	31.8	26.2	27.1	4.18	0.81		52.7	36.0	11.3	SANDY LOAM
13380	91CSP-5	0.0-0.5	8.1	1.32	29.1	6.67	5.34	1.59	0.65	60.2	50.0	38.7	11.3	LOAM
13394	13380(DUP)	0.0-0.5	8.1	1.23	28.8	6.45	5.53	1.25	0.51		52.9	35.8	11.3	SANDY LOAM
13390		5.0-7.0	8.2	3.51	44.2	7.46	26.4	4.69	1.14	38.5	43.3	42.7	14.0	LOAM
13395	13390(DUP)	5.0-7.0	8.2	3.34	47.2	7.72	28.0	4.67	1.11		40.2	46.7	13.1	LOAM

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13349		1.0-2.0	0.5	30.1	0.92	0.95	2.08	2.0		0.04		
13392	13349(DUP)	1.0-2.0	0.2	30.0	0.42	1.08	2.13					
13376		1.0-2.0	5.5	21.6	0.53	0.62	1.71	1.5		0.28		
13393	13376(DUP)	1.0-2.0	5.2	22.2	0.44	0.61	1.66					
13380	91CSP-5	0.0-0.5	1.4	23.7	0.58	0.16	1.61	2.0		0.07		
13394	13380(DUP)	0.0-0.5	1.5	23.4	0.65	0.16	1.87					
13390		5.0-7.0	2.0	31.1	0.85	0.73	3.73	1.7		0.12		
13395	13390(DUP)	5.0-7.0	2.3	30.2	1.03	0.74	3.98					

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13545	91LB-1	0.0-4.0	7.8	1.24	39.5	7.59	2.31	1.96	0.88	17.7	74.5	22.2	3.3	LOAMY SAND
13546		4.0-8.0	8.0	0.71	27.7	3.98	1.37	0.69	0.42	55.7	78.2	18.5	3.3	LOAMY SAND
13547		8.0-24.0	8.0	1.05	30.5	6.01	2.62	0.81	0.39	58.8	63.6	30.4	6.0	SANDY LOAM
13548		24.0-48.0	8.2	0.69	25.5	2.70	3.43	1.00	0.57	72.7	65.5	29.4	5.1	SANDY LOAM
13549		48.0-96.0	7.9	5.08	29.7	23.2	30.6	2.98	0.57	30.3	67.3	27.6	5.1	SANDY LOAM
13550	91LB-2	0.0-8.0	7.9	0.67	35.6	4.39	1.43	0.57	0.33	27.0	70.9	24.9	4.2	SANDY LOAM
13551		8.0-16.0	7.9	0.58	30.3	3.66	1.01	0.70	0.46	54.1	58.2	35.8	6.0	SANDY LOAM
13552		16.0-24.0	7.9	0.67	26.9	3.52	2.27	0.86	0.51	77.1	68.2	27.6	4.2	SANDY LOAM
13553		24.0-48.0	8.1	0.52	29.8	2.66	2.78	0.63	0.38	40.5	57.3	37.6	5.1	SANDY LOAM
13554		48.0-96.0	8.0	2.38	29.9	12.7	16.0	1.46	0.39	32.5	66.4	27.6	6.0	SANDY LOAM
13555	91LB-3	0.0-2.0	7.9	0.66	35.0	4.38	1.18	1.67	1.00	63.5	67.3	29.4	3.3	SANDY LOAM
13556		2.0-8.0	7.9	0.46	33.1	3.12	0.84	0.89	0.63	45.7	58.2	35.8	6.0	SANDY LOAM
13557		8.0-16.0	8.1	0.44	28.4	2.53	0.97	0.69	0.52	72.3	57.3	35.8	6.9	SANDY LOAM
13558		16.0-96.0	7.9	3.36	28.8	14.5	26.6	3.12	0.69	42.6	60.2	33.8	6.0	SANDY LOAM

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13545	91LB-1	0.0-4.0	2.4	19.2	2.37	0.73	4.22	1.6	<0.1	0.15	12.7	6.7
13546		4.0-8.0	0.5	18.6	0.25	0.52	2.76	**	**	0.05	9.0	4.5
13547		8.0-24.0	0.9	22.7	0.53	0.47	3.39	1.7	0.1	0.07	13.9	5.6
13548		24.0-48.0	0.5	23.2	0.25	0.14	3.25	1.8	<0.1	0.05	12.2	5.4
13549		48.0-96.0	0.9	18.6	0.49	0.49	2.23	1.6	<0.1	0.05	11.5	4.7
13550	91LB-2	0.0-8.0	0.7	18.8	0.60	0.16	3.58	1.7	<0.1	0.12	13.7	6.3
13551		8.0-16.0	0.6	18.3	0.18	0.13	3.28	1.4	<0.1	0.06	13.3	5.3
13552		16.0-24.0	0.7	23.3	0.27	0.15	4.42	**	**	0.05	13.7	5.4
13553		24.0-48.0	2.2	22.5	0.11	0.09	3.77	1.5	0.1	0.05	12.5	4.7
13554		48.0-96.0	0.6	18.7	0.16	0.22	2.34	1.6	0.1	0.05	11.8	4.8
13555	91LB-3	0.0-2.0	2.8	19.1	0.76	0.29	3.85	**	**	0.11	12.7	5.4
13556		2.0-8.0	1.4	19.0	0.34	0.16	3.25	1.5	0.1	0.09	13.2	5.2
13557		8.0-16.0	0.8	22.7	0.23	0.17	3.44	1.5	<0.1	0.05	14.3	5.7
13558		16.0-96.0	0.8	22.6	0.05	0.40	2.34	1.4	0.1	0.06	12.4	4.9

* Air dry bulk density was substituted for 1/3 bar bulk density.
** No clods present in sample to do a bulk density.
Abbreviations for extractants: PE= Saturated Paste Extract, H2OSol= water soluble, ABPIA= Ammonium Bicarbonate-DPTA, AAO= Acid Ammonium Oxalate

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CO-OP MINING COMPANY
HUNTINGTON, UTAH
MINE: BEAR CANYON

DATE REPORTED: September 30, 1991

Lab No.	Location	Depths	pH	EC mmhos/cm @ 25°C	Saturation %	Calcium meq/l	Magnesium meq/l	Sodium meq/l	SAR	Coarse Fragments %	Sand %	Silt %	Clay %	Texture
13552		16.0-24.0	7.9	0.67	26.9	3.52	2.27	0.86	0.51	77.1	68.2	27.6	4.2	SANDY LOAM
13560	13552(DUP)	16.0-24.0	7.9	0.78	28.0	4.47	3.08	0.91	0.47		67.5	27.4	5.1	SANDY LOAM

Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage, Exch= Exchangeable, Avail= Available

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Lab No.	Location	Depths	Organic Matter %	Carbonate %	P ppm	K PE meq/l	Alkalinity PE meq/l	Bulk Density *	Water Retention Difference in/in*	Total Kjeldahl Nitrogen %	1/3 bar	15 bar
13552		16.0-24.0	0.7	23.3	0.27	0.15	4.42			0.05		
13560	13552(DUP)	16.0-24.0	0.7	23.5	0.16	0.19	5.15					

* Air dry bulk density was substituted for 1/3 bar bulk density.
Abbreviations for extractants: PE= Saturated Paste Extract, H2OSol= water soluble, ABPTA= Ammonium Bicarbonate-DPTA, AAO= Acid Ammonium Oxalate